Motto: "The Light of Science."

PRESENTED BY THE AUTHOR

To the Royal College of Physicians, Edinburgh

Through its President,

for the service of science & suffering humanity.

SCARLET FEVER; ITS CURE—

based on the chemistry of the human body, and confirmed by medical science and practice,—being the Sequel to "Asiatic Cholera," and submitted along with it for the "Prix Bréant," to the Academy of Sciences, Paris;

BY

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formerly in practice in the East.

I am the Resurrection and the Life—I have the keys of death and the grave—To him that overcometh will I give to eat of the tree of life—said JESUS.

The last enemy that shall be destroyed is death—said PAUL.

There is no reason in *physics* why man *should* die.

TASMANIA:

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Prefatory Observations.

Sufficient has been said in the preceding part on Cholera for me to refrain from adding much here. I need hardly repeat that a cure is not of the nature of a charm ; that nature is manifold in the human mikrokosmos and marvellous in diversity, as are also symptoms of a disease and remedies, but all agree in one and to one end ; that the knowledge of any disease requires the most varied, minute, difficult, and intricate, scientific study, united with large and extended practice ; and that after a disease is fully made known, it is left to scientific practitioners to apply the knowledge varied in every individual instance.

As also in the part on Cholera, I need not to describe here the varieties, symptoms, pathology, and morbid anatomy of scarlet fever. I must assume all these to be known.

I am convinced of one thing, that it is most humiliating to me as a medical man and as a student of science, to glance over the best text books of medical practice—which we teach our students in the universities—and see the very plain confession made everywhere, that we actually know little, if anything, scientifically and assuredly, of the true nature and treatment of the great epidemic diseases. Is the treatment of disease to rest on an empiric foundation ? Scarlet fever, like cholera, has remained as yet unknown. As I am now blessed with leisure, and have had the most extended practice over large portions of the earth's surface, I have devoted the remainder of my life to the scientific investigation of diseases.

Every government ought to have a special scientific medical department, wholly and solely devoted to studying the chemistry of the human body in health and disease. With such bodies in active operation in some half-a-dozen leading States, and co-operating together, we shall soon wipe away the reproach of empiric treatment, make a permanent and solid advance into the regions of darkness and disease, and place medical science on that high pedestal it ought to occupy as the Queen science of all physical sciences—the science of life and death.

If I have lifted the veil from off the two most unknown, remarkable, and even fatal diseases, and discovered the nature, causes, and treatment of cholera and scarlet fever, *where* they lie in the chemical foundations of our being and the chemistry of physics, I take no merit to myself ; but, under that Light which illumines everyone, and the use of prescribed logical and mathematical rigid procedure and rule, I ascribe it all to those faithful, devoted, eminent sons of medical and chemical science who have set their mark on nature—a special band in their value to peoples and States, to the whole human race—the sons of Light, and the true band of "the Immortals," who have furnished me with my materials.

Scarlet Fever : Its Cure.

Without any other observation we may note that here, too, the *formulæ* furnished in cholera may be retained ; but for N, nutriment, understanding principally the carbon of it ; O for the oxygen ; and C the contact of the N and O in the blood, *i.e.*, the oxidation of the carbon of the food. But here it is the excessive contact of the oxygen, and which may imply defective carbon, and not, as in cholera, the deficient contact, that creates the abnormal condition resulting in scarlet fever. Hence these two diseases present, within very nearly the same chemical range, such exactly *balancing*, and sometimes similar, characters ; the defect of the soda of the body in cholera, too, being replaced in

scarlet fever by the defect of the potash ; and the death of the corpuscles in cholera in one way, by their death in scarlet fever in another way. Let us now see these things more particularly.

I. Becquerel and Rodier furnish the following as the mean composition of male blood :—

Water				779·00
Fibrin				2·20
Fatty matters				1·60
Albumen				69·40
Corpuscles				141·10
Salts, &c.				6·80
Iron				0.57
In blood there is of serum	87	or serum		869·15
clot. .	13	clot...		130·85
	100			1000·00

Of the serum 869·15 there is water...		790 37
albumen		67·8
Salts, &c.		10·98
		869·15

Of the clot 130·85 there is globules (albumen, and fibrine)	125·63
hematosine	2·27
separate fibrine	2·95
	130·85

Take also the following once for all occasions in also subsequent sections, noting the carbon :—

Components.	*Albumen.*	*Fibrin.*
Carbon	55·46 (atoms 216)	54·45 (atoms 216)
Hydrogen	7·20 (,, 169)	7·07 (,, 169)
Nitrogen	16.48 (,, 27)	17·21 (,, 27)
Oxygen	18·27 (,, 68)	19·35 (,, 68)
Sulphur	2 16 (,, 2)	1·59 (,, 2)
Phosphorus	0·43	0·33

Note in both the proportion of carbon. Excessive oxidation, by using up all the carbon, destroys the albumen. The microscopic character of mucus and albumen corpuscles are both identical. They vary under different pathological conditions of the patient. Their difference is in the composition of the fluid in which the particles float. Albumen is soluble in potash. Phosphoric acid, too, has a decided solvent action on it. Nitric and hydrochloric acids precipitate it, and nitrate of silver also affects it.

II. We see also in the above analyses the proportion of fibrin in the blood. If moist fibrin is digested in a solution of nitrate of potash containing a little soda, at a temperature of about the blood (a little higher), it gradually becomes converted into a substance in almost every respect identical with albumen. In inflammatory diseases the proportion of fibrin goes up as high as 10 in 1000. The coagulation of blood is due to fibrin previously dissolved becoming insoluble, and forming a fine network or jelly, in which the globules are enclosed, as may be seen from the morbid anatomy of scarlet fever. The coagulation of blood presents the same fibrinous aspect as when blood is drawn and exposed to the oxygen. Coagulation is retarded for a considerable

time by a strong solution of nitrate of potash, or of muriate of ammonia; and fibrin, after blood has been allowed to coagulate, is gradually dissolved by the latter.

Hematofibrin is formed from gelatine and choleic acid = albumen and water :—

$$\left.\begin{array}{r}1 \text{ eq. hematofibrin} \\ +\ 18 \text{ ,, water}\end{array}\right\} = \left\{\begin{array}{l}3 \text{ eqs. gelatine} \\ 1 \text{ ,, choleic acid.}\end{array}\right.$$

Consequently, loss of bile, as albumen in a state of conversion is bile (and gelatine), which loss occurs in scarlet fever, means non-renewal, non-supply, of fibrin.

III. Choleic acid fully oxidised will yield as follows :—

$$\left.\begin{array}{r}1 \text{ eq. choleic acid} \\ +\ 144 \text{ ,, oxygen}\end{array}\right\} = \left\{\begin{array}{l}1 \text{ eq. ammonia} \\ +\ 2 \text{ ,, sulphuric acid} \\ +\ 52 \text{ ,, carbonic ,,} \\ +\ 42 \text{ ,, water}\end{array}\right\} \text{All ultimate products of oxidation.}$$

And cholic acid :—

$$\left.\begin{array}{r}1 \text{ eq. cholic acid} \\ +\ 122 \text{ ,, oxygen}\end{array}\right\} = \left\{\begin{array}{l}1 \text{ eq. ammonia} \\ +\ 52 \text{ ,, carbonic acid} \\ +\ 40 \text{ ,, water}\end{array}\right.$$

These acids are the products of the destruction of sanguigenous matter by the oxygen of the blood. The colouring matter of the bile exhibits changes connected with the formation or destruction of the bile; and we know that blue colouring matters are turned green by by alkalis, and red by acids. A red colouring matter is turned green by alkalis, and is also very fugitive. It is also soluble in water and alcohol. Bile may be decolourised by dissolving it in absolute alcohol to separate mucus, and digesting the alcoholic solution with animal charcoal till the colour is removed.

We may note here also the oxidation of albumen :—

$$\left.\begin{array}{r}4 \text{ eqs. albumen} \\ +\ 40 \text{ ,, water} \\ +224 \text{ ,, oxygen from the air}\end{array}\right\} = \left\{\begin{array}{l}4 \text{ eqs. choleic acid} \\ +\ 8 \text{ ,, cholic acid} \\ +12 \text{ ,, urea} \\ +26 \text{ ,, carbonic acid}\end{array}\right.$$

$$= \left\{\begin{array}{l}4 \text{ eqs. albumen} \\ +\ 40 \text{ ,, water} \\ +\ 32 \text{ ,, oxygen from the air} \\ +\ 192 \text{ ,, oxygen} \\ \left.\begin{array}{l}6 \text{ margarine} \quad \ldots \quad \ldots \\ 12 \text{ water} \quad \ldots \quad \ldots \quad \ldots\end{array}\right\} = 20 \text{ eqs. sugar.}\end{array}\right.$$

Thus (20 eqs.) sugar yields both fat and oxygen. Sugar is a source whence blood may obtain oxygen when respiration is impeded.

IV. The juice of flesh is uniformly, or more frequently, acid. The acids present are lactic acid in large quantity, phosphoric acid, and other acids. The bases are potash in large proportions, both as phosphate, lactate, inosinate, etc., and as chloride of potassium; soda in much smaller quantity, chiefly as chloride of sodium; etc. The composition of flesh is :—

$$\left.\begin{array}{lr}\text{Water} \quad \ldots \quad \ldots \quad \ldots \quad \ldots & 78 \\ \text{Fibrin, \&c.} \quad \ldots \quad \ldots \quad \ldots & 17 \\ \text{Albumen, \&c.} \quad \ldots \quad \ldots \quad \ldots & 5\end{array}\right\} = 100$$

Acid tribasic phosphate of potash $PO_5 \left\{\begin{array}{l}KO \\ 2\,HO\end{array}\right\}$ exists in large proportion in the juice of flesh, chiefly contributing to its acidity, and is produced by phosphoric acid acting on chloride of potassium or salts of potash. Just as soda is essential to blood, potash is essential to

juice of flesh. As excess of alkali is required to form the blood to enable it to perform its functions of destroying the tissues by oxidation, so phosphoric acid in excess is required for the production of the tissues. In scarlet fever, where there is great oxidation, a plentiful supply of potash is needed,—also to solve fibrin.

V. Animal heat is promoted by everything that increases the supply of oxygen, as increased respiration, as in children from running about; or cold with abundant food, or warm clothing, both of which exist in and immediately following winter, the period for scarlet fever, and children and the young form the subjects of attack. Carbon and hydrogen are the chief sources of animal heat in their oxidation; that is, oxygen acting on starch, sugar, and fat, the principal food of the young The proportion of carbon to nitrogen, which furnishes no combustion, is as great in all the *excreta* as in albumen, or even greater. And the albumen, from which fibrin is made, is destroyed from the deficiency of carbon, which is rapidly oxidised in scarlet fever. We may also remember that uric acid, which is apt to be secreted in fever, is dissolved in moderately dilute potash.

VI. We thus see albumen a chief constituent of the body, and carbon of it; fibrin from it; and fibrin and albumen destroyed in scarlet fever. A deficiency of carbon affects both albumen and fibrin; or excessive oxygen and oxidation, which produces the deficiency. Potash is the great base of the juice of flesh; and potash acts on both albumen and fibrin. The bile supplies the carbon, but is oxidised by excess of oxygen to produce its acids, and hence bile and acids are equally lost in scarlet fever.

Hence—

$$\left\{\begin{array}{l}\text{Defect of carbon or,—and,—excess of oxygen}\\ \text{and ,, ,, potash or,—and,— ,. ,, soda}\end{array}\right\}$$

furnish us with all the blood and other symptoms of scarlet fever; and the cure. The equation is perfect.

VII. Our task is over; but it is interesting to observe the *balancing* parallelism and analogy between cholera and scarlet fever, one illustrating and confirming the other. We have already shown how the cholera *formulæ* may be applied here, and we proceed to other points. In scarlet fever the temperature rises to even 112° F., the pulse is even 130, there is great surface heat, and an external eruption; in cholera the temperature goes down to even 72° F., the pulse is hardly perceptible, there is great coldness of surface, and an internal exudation. In the one the tissues are relaxed, and the tendency is to dropsy; in the other the tissues are collapsed, and the sequel is fever. In the one excess of oxidation and deficiency of carbon; in the other deficiency of oxidation and excess of carbon. In the one the bile is emptied and lost; in the other the bile is full to congestion. In the one the juice of flesh is affected because there is deficiency of potash and excess of soda; in the other the vital fluid is affected because there is deficiency of soda and excess of potash. In the one there is destruction of albumen; in the other accession of it. In the one the hæmatofibrin solidifies through excess of oxygen and soda and defect of carbon; in the other the blood corpuscles perish through excess of carbonic acid and potash and defect of oxygen. In the one the upper air-vessels are seized; in the other the lower intestines. The one appears when ozone is excessive and carbon deficient; the other when ozone is deficient and carbon excessive. The one appears when there is a want of

vegetables and fruits; the other when there is a superabundancy of them. The one shows in winter or early spring; the other in summer or early autumn. The one is unknown in the sultry plains of torrid climes; the other is unknown in very cold and elevated regions. The one has its *habitat* in cold climates; the other has its *locale* in hot climates. The one in bad cases shows a skin vividly scarlet; the other in the worst cases almost dark blue. The one should be treated with chlorate of potash, carbon (a vegetable diet), and coolness, etc.; the other with chloride of sodium, oxygen, warmth, etc. Both the diseases present every degree of severity between the mild and malignant forms, as even in scarlet fever sometimes the patient sinks at once and irretrievably under the virulence of the attack, and life is extinguished in a few hours. In both the fatality depends on the type of the prevailing epidemic. Both assume an epidemic existence.

We need not to carry on the parallelism and analogy any further. It is perfect like the equation furnished above for scarlet fever, which equation also, to make the parallelism still more remarkable, may be applied for cholera with the changes implied in the parallel; thus:—

$$\left\{\begin{array}{l}\text{Defect of oxygen or,—and,—excess of carbon}\\ \text{and ,, ,, soda or,—and,— ,, ,, potash}\end{array}\right.$$

furnish us with all the blood and other symptoms of cholera; and the cure. This equation, too, is perfect.

I have impressed the abstract sciences of logic and mathematics, and the physical sciences of chemistry, physiology, pathology, morbid anatomy, and the observation and practice of disease, to discover, by *formulæ*, and rigid rule, the truth, and to prove it; and thus, notwithstanding *lacunæ* to the unlearned, I have now brought another of the unknown and most fatal of diseases to "the Light of Science."

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